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(54) LOW TEMPERATURE MATERIAL STORAGE TANK

(71) We, MOTHERWELL BRIDGE ENGINEERING LIMITED, a British Company of P.O. Box 4, Motherwell, Lanarkshire, Great Britain, do hereby declare the invention, for which we pray that a patient may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to tanks for the storage of material at low temperature, such materials including, for example, liquid butane, ammonia, and nitrogen.

In the construction of such tanks it is known to provide a mass of thermal insulant forming part of the tank base. The thermal insulant is normally foamed glass preformed into blocks of square cross-section, the blocks being bound together by layers of bituminised felt. This construction however does not have sufficient strength to support the entire tank when in its operational condition and for this reason the thermal insulant mass has been surrounded by a ring wall made of lightweight concrete or similar material cast *in situ* to provide a high load-bearing capacity and low compressibility.

The *in situ* construction of the ring wall is inconvenient and prevents full use of quality control on the product, and for this reason one prior proposal is to construct the ring wall from blocks of the same dimension as the thermal insulant and to bind together the entire base structure so formed by extending the layers of bituminised felt through the ring wall. This proposal is described in more detail in U.K. Patent Specification No. 1,453,330.

It is an object of the present invention to provide a tank for the storage of material at low temperature, and wherein the tank base is of simplified construction.

According to the present invention there is provided a tank for the storage of material at low temperature, comprising a storage chamber laterally defined by a peripheral wall which is supported on a thermally-insulating base formed by a body of thermally-insulating material surrounded by a ring wall made of load-supporting members arranged in abutment and mechanically bound together by means independent of the body of thermally-insulating material, wherein each load-supporting member is precast with formations so positioned that the formations of adjacent load-supporting members are in registry when the load-supporting members are in said abutment and form at least part of said mechanical binding means.

Embodiments of the invention will now be described by way of example with reference to the accompanying drawings, in which:

Fig. 1 illustrates part of a ring wall for a storage tank;

Fig. 2 illustrates one of the load-supporting members of the wall;

Fig. 3 is a sectional view showing part of a storage tank mounted on a thermally-insulating base incorporating the wall of Fig. 1;

Fig. 4 shows an alternative construction of ring wall; and

Fig. 5 illustrates one of the load-supporting members of the wall of Fig. 4.

The ring wall of Fig. 1 is constructed of load-supporting members 10 abutted edge-to-edge around the ring and devoid of joints extending horizontally between adjacent members 10. The abutting faces of the members 10 are shaped so that one has a tongue 11 and the other has a groove 12 dimensioned to receive the tongue 11. Thus the tongue and groove together constitute an interfitting means which mechanically bind together adjacent ones of the members 10. It will be noted that each member 10 has a tongue 11 and a groove 12 formed at opposing vertical faces and that the top face of each member 10 incorporates a groove 13 so that when the ring wall is assembled the grooves 13 of the members together form an annulus. To facilitate lifting of the members 10 through holes 14 are provided and these holes 14 may be used

for pinning the ring wall into the insulation mass which the ring wall surrounds.

Fig. 3 illustrates schematically the ring wall 20 resting upon a concrete screed 21 with a bituminous covering 21A. The groove 13 of the wall 20 accommodates a tongue formed on a concrete panel 22 the upper surface of which supports the floor 23A of the inner tank structure 23. It will be noted that the wall 24 of the structure 23 is located directly above the wall 20. The tank includes an outer tank structure 25 having a wall 26 and a floor 27 on which the screed 21 is carried. In such a tank thermal insulating material is located between the walls 24, 26 and a mass of thermal insulant is located between the tank floors and bounded by the ring wall 20.

Fig. 4 illustrates an alternative construction of ring wall containing several layers of blocks 30 one of which is shown in Fig. 5 and having both vertical and horizontal joints. In this embodiment the blocks 30, which function as the load suporting members of the wall 1 are rectangular in shape and with two through holes 31 which are so disposed that when the blocks 30 are arranged in staggered formation the holes in the various layers are in registry and can accommodate pins 32 whereby the ring wall is held together with adjoining blocks 30 in abutment as shown. All of the blocks 30 need not be aligned around the wall, some blocks such as those denoted 30A may project laterally from the wall to protrude radially inwardly into the thermal insulant mass in order to achieve a keying effect. In this embodiment bituminous felt may be used between the layers of the ring wall but separate from any bituminous felt which may be used within the body of insulating material.

The pins 32 are one form of rigid means which form part of the interfitting or mechanical binding arrangement for the ring wall of Fig. 4. Another convenient form would be to cast the pins 32 *in situ* from concrete or resinous material.

WHAT WE CLAIM IS:—

1. A tank for the storage of material at low temperature, comprising a storage chamber laterally defined by a peripheral wall which is supported on a thermally-insulating base formed by a body of thermally-insulating material surrounded by a ring wall made of load-supporting members arranged in abutment and mechanically bound together by means independent of the body of thermally-insulating material, wherein each load-supporting member is precast with formations so positioned that the formations of adjacent load-supporting members are in registry when the load-supporting members are in said abutment and form at least part of said mechanical binding means.

2. A tank as claimed in Claim 1, wherein the ring wall is devoid of joints extending horizontally between adjacent load-supporting members and said mechanical binding means comprises a tongue and a groove respectively formed at opposite vertical faces of each load-supporting member.

3. A tank as claimed in Claim 2, wherein the top face of the ring wall is provided with an annular groove and the tank base includes a concrete screed having an annular tongue fitting said annular groove.

4. A tank as claimed in Claim 2 or Claim 3, wherein through holes are provided in the supporting members.

5. A tank as claimed in Claim 1, wherein the ring wall incorporates several layers of load-supporting members providing both horizontal and vertical joints and said mechanical binding means comprises vertically-extending holes in each load-supporting member and rigid means extending through the aligned holes of said layers.

6. A tank as claimed in Claim 5, wherein the rigid means is in the form of a pin.

7. A tank as claimed in Claim 5, wherein the rigid means is formed *in situ* by casting of concrete or resinous material.

8. A tank for the storage of material at low temperature and substantially as herein-before described with reference to any one of the embodiments of the accompanying drawings.

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Fig.1.

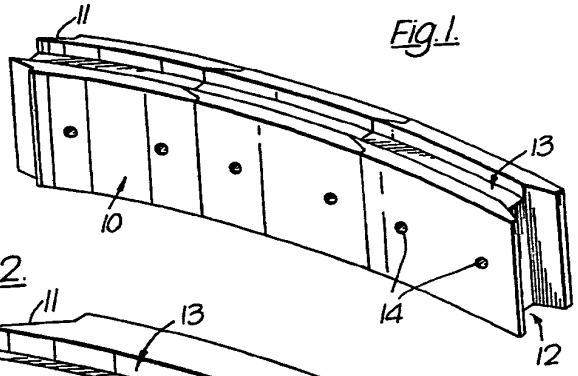


Fig.2.

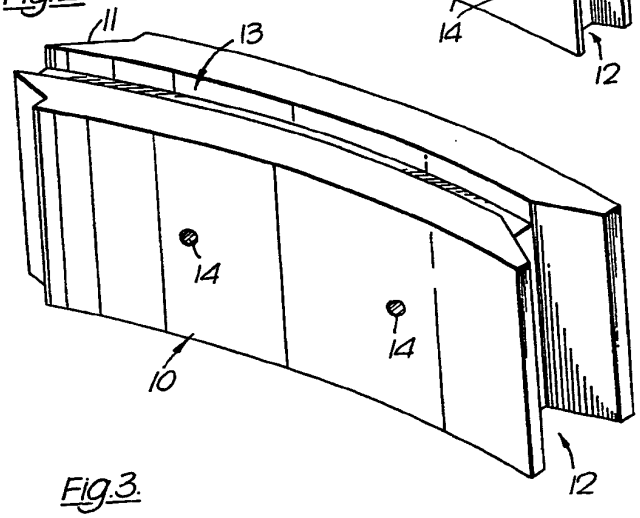
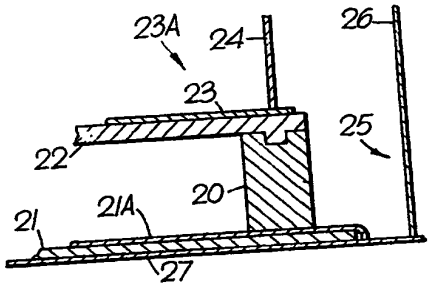


Fig.3.



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Sheet 2

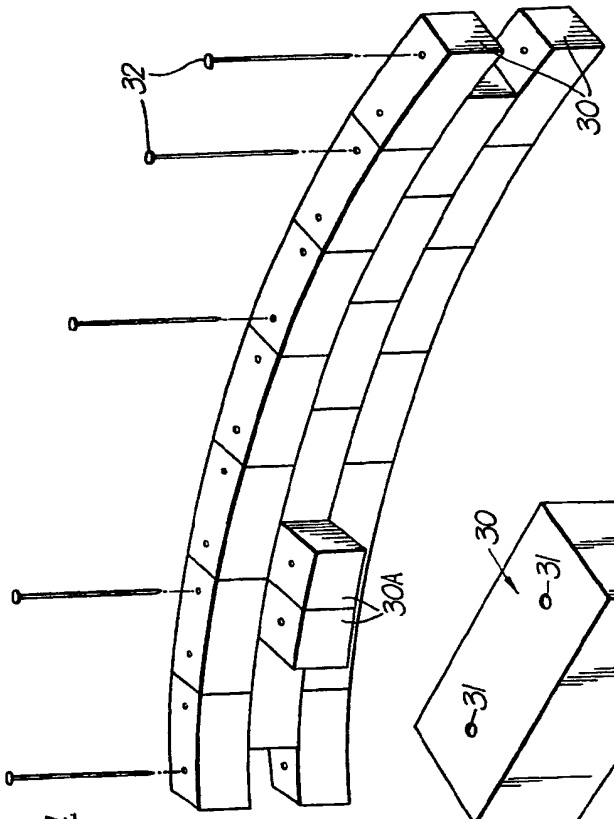

Fig.4

Fig.5.